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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/609,069	06/27/2003	K. Scott Weil	12903-B	7459

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EXAMINER	
ECHELMEYER, ALIX ELIZABETH	
ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/609,069	WEIL ET AL.	
	Examiner	Art Unit	
	Alix Elizabeth Echelmeyer	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 10, 2008 has been entered.

2. Claims 1 and 13 have been amended. Claims 1-21 are pending and are rejected for the reasons given below.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3, 8-15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haltiner et al. (US 2003/0235746) in view of Thomas et al. (US 2005/0074659) and Pondo (US 6,017,649).

Haltiner et al. teach a solid oxide fuel cell (SOFC) having sheet metal parts stamped from flat stock (abstract, [0009], [0010]). The parts, including a mounting frame for a positive electrode – electrolyte – negative electrode (PEN) and a separator plate,

are used to form modules, or cells (abstract, [0009]). Those modules can then be stacked to form a fuel cell stack (Fig. 7, [0032]). Haltiner et al. also teach the use of current collectors which may be connected across a load (Fig. 3, [0003], [0025]). Glass seals are used between the modules. A glass layer or ceramic adhesive is applied prior to assembly, then the stack is "subjected to high pressure ad temperature, whereby the glass seals are liquefied and fused" ([0032]).

Regarding claim 1, the SOFC modules of Haltiner et al. contain a stamped separator plate, a stamped frame, a PEN attached to the frame, and the frame attached to the separator plate. Regarding claims 3 and 17, the SOFC of Haltiner et al. contains current collectors that are in communication with the separator plate. Applicants' claim 8 is for a method of making a SOFC stack, and claim 13 is a SOFC stack. Haltiner et al. teach the combination of several modules to form a stack as well as the sealing of the modules.

Applicants' claims 9-12, 14, and 15 are drawn to the method of sealing a SOFC stack and the seal on the SOFC stack. Haltiner et al. teach insulating seals made of glass or a ceramic. The seal is formed by exposure to high temperature and pressure. Further, Haltiner et al. teach the connection of separator plates and frames by brazing.

As for the limitation in claims 1 and 13 requiring a support bump in the frame or separator plate, Haltiner et al. fail to teach a support bump.

Thomas et al. teach gas flow control formations, or support bumps, that serve as spacers to control the spacing of the separator plate in the fuel cell ([0021]).

It would be desirable to use gas flow control formations, or support bumps, on the separator of Haltiner et al. such as taught by Thomas et al., since such support bumps would ensure proper spacing in the cell, which might allow for gas to flow in the absence of a gas diffusion layer, or would ensure that the proper amount of gas could be made available since there would be sufficient space for the gas due to the spacers.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use gas flow control formations, or support bumps, on the separator of Haltiner et al. such as taught by Thomas et al., since such support bumps would ensure proper spacing in the cell, which might allow for gas to flow in the absence of a gas diffusion layer, or would ensure that the proper amount of gas could be made available since there would be sufficient space for the gas due to the spacers.

With further regard to claims 1 and 13, Haltiner et al. in view of Thomas et al. fail to teach the stamped separator plate and frame with displaced outer edges. Instead, Haltiner et al. teach a composite, with the cathode spacer and separator being analogous to the stamped separator plate, and the anode spacer analogous to the frame, but lacking the downwardly displaced outer edge (see Figure 4 of Haltiner et al.).

Pondo teaches multiple step manifolds for the fuel and oxidant streams (column 2 line 66 - column 3 line 9). A fuel cell assembly is seen in Figure 3B of Pondo. Pondo teaches that the upward and downward bends of the plates make for a better seal in the manifolds as well as better integrity of the plates, and the resultant fuel cell can tolerate

greater stack pressures (column 3 lines 1-6). Pondo further teaches that the bent pieces may be made by stamping sheet metal (column 6 lines 51-57).

It would be advantageous to make the separator plate of Haltiner et al., with the cathode spacer, into one piece such as seen in the separator plate of Haltiner et al. (as seen in Figure 3B, for example), with an upward bend at the manifold, wince such a configuration would make a better seal and increase the strength and integrity of the fuel cell. Further, such a bent configuration would be advantageous to use with the anode spacer of Haltiner et al., such as seen in the bottom separator of Pondo (Figure 3B), since it would provide a better seal since it would meet with the bent part of the separator in the cell below, through which the fuel would have to pass.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the cathode spacer and separator of Haltiner et al. in view of Thomas et al. into a single piece that is bent upwardly, such as in Pondo, and to make the anode spacer, or frame, into a piece that is bent downwardly so as to form a seal with the adjacent separator of the cell below.

5. Claims 2 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haltiner et al. in view Thomas et al. and Pondo as applied to claims 1 and 13, above and in further view of Carolan et al. (US Patent Number 5,750,279).

The teachings of Haltiner et al., Thomas et al. and Pondo as discussed above are incorporated herein.

Haltiner et al. in view Thomas et al. and Pondo teach a fuel cell stack and the method of making it wherein the stack is made up of modules. The modules are formed by frames containing a PEN, which are connected to separator plates. Haltiner et al. in view Thomas et al. fail to teach the use of 400 series stainless steel as the material for the frames and separators.

Carolan et al. teach that stainless steel (400 series) is suitable for use in SOFC's because it is resistant to corrosion and oxidation.

It would be favorable to use 400 series stainless steel as taught by Carolan et al. in the SOFC of Haltiner et al. in view Thomas et al. because 400 series stainless steel can be stamped as required in Haltiner et al. in view Thomas et al. and Pondo, and it is also resistant to corrosion and oxidation.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the 400 series stainless steel of Carolan et al. in the SOFC of Haltiner et al. in view Thomas et al. and Pondo because 400 series stainless steel is resistant to corrosion and oxidation.

6. Claims 4-7 and 18-21 rejected under 35 U.S.C. 103(a) as being unpatentable over Haltiner et al. in view Thomas et al. and Pondo as applied to claims 3 and 17 above, and in further view of James et al. (US Patent Number 5,766,789 A).

The teachings of Haltiner et al., Thomas et al. and Pondo discussed above are incorporated herein.

Haltiner et al. in view Thomas et al. and Pondo teach the use of a 400 series stainless steel electrically conducting interconnect. Haltiner et al. in view Thomas et al. and Pondo fail to teach the use of a flexible material such as a screen for those interconnects.

James et al. teach the use of a screen as a flexible material for an interconnect (column 3 lines 24-26). James et al further teach a compound containing mostly (76%) nickel for the formation of the screen used as the current collector in the anode.

By forming the current collector of Haltiner et al. in view Thomas et al. and Pondo with the screen of James et al., a current collector made from a flexible, electrically conductive material is made.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to make the current collector of Haltiner et al. in view Thomas et al. and Pondo with the screen of James et al. in order to make a flexible, electrically conductive current collector.

Response to Arguments

7. Applicant's arguments have been considered but are moot in view of the new grounds of rejection. The new grounds of rejection were necessitated by the new issues raised in the amendment.

The examiner recognizes that Applicant has argued that the cited prior art from the previous rejection teaches away from the newly added limitations to the bent plates. The examiner disagrees. On page 6, Applicant notes that Haltiner et al. teach that a fuel

cell of the configuration shown in their patent does not require forming operations because the spacers are used instead. Yet, one of ordinary skill in the art, viewing Haltiner et al. in view of Pondo, would recognize the benefits of forming the cathode spacer and separator into one pieces because such a formation would allow for greater pressures to be applied to the stack - since there is only one piece where two were, and the one piece is stronger because it is integral but still performs the same function.

On page 7, Applicant asserts that Thomas et al. teach away from having the oxygen manifold integral to the plates, and instead teach the manifold as external, since making the manifolds internal yields a more complicated construction of the plates. Still, one of ordinary skill in the art would recognize that the advantages of having the manifold integral to the plates, such as in Haltiner et al. and Pondo, may outweigh the disadvantages, for example because a better seal could be made such as in the configuration of Pondo.

As for Applicant's arguments that neither Carolan et al. nor James et al. teach stamping the plate, the examiner contends that these references are used to show that the material choices are obvious. Carolan et al. teach the use of stainless steel, which one of ordinary skill in the art would recognize can be stamped. James et al. teach current collectors made of flexible material. The examiner notes that the claims do not require that the current collectors be stamped.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is (571)272-1101. The examiner can normally be reached on Mon-Fri 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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